

# Uncovering Undergraduates' Innovative Talents towards Employment Generation for National Growth and Development: Implications of Integrating Entrepreneurship Education into Science Teacher Education Programmes in Rivers State

**Dr. Inibehe Sunday Etokeren**

Department of Science Education, Faculty of Education, Rivers State University, Port Harcourt, Rivers State, Nigeria  
wororolly@gmail.com

**Dr. Chinda Worokwu**

Department of Chemistry, Faculty of Natural and Applied Sciences, Ignatius Ajuru University of Education, P.M.B. 5047, Rumuolumeni, Port Harcourt, Rivers State, Nigeria

**Abstract:** Innovative talents remain imperative for maximum and proper utilization of a nation's limited resources to attain insurmountable advancement in scientific and technological achievements. Ideally, Innovation is a basic need for national progress and sustainable development mostly in developing nations like Nigeria. It is tough for any country to survive in today's competitive and digital world without innovations and creativity. This study therefore, aims at examining the implications of integrating entrepreneurship education into science teacher education programmes towards employment generation for national growth and development. The sample consisted of 311 science education undergraduates from Rivers State Tertiary institutions, and the survey was conducted using a descriptive survey technique. The study was guided by three research questions and two hypotheses. Two Science Education and one Measurement and Evaluation Lecturers validated a 15-item questionnaire titled "Implications of Integrating Entrepreneurship Education into Science Teacher Education Program towards Employment Generation Questionnaire." The Pearson Product Moment Correlation coefficient was used to obtain the reliability coefficient of 0.79. To answer research questions, mean and standard deviation were employed, and the hypotheses was evaluated using the z-test at the 0.05 level of significance. The study's findings revealed that entrepreneurship education assists science education undergraduates in: possess practical entrepreneurial skills with positive attitude and business competencies, identify noble business opportunities, be creative and innovative, manage small-scale industries and take risk in business to ensure self-employment and self-reliance. This helps in reduction of unemployment and poverty rate and promote national development of Nigeria. In Rivers State, there was no significant gender difference in the influence of entrepreneurship education on the employment generation of science education undergraduates. Lecturers must therefore motivate scientific education students to develop entrepreneurial abilities, and science education graduates should be provided incentives to establish small businesses after graduation, among other recommendations.

**Keywords:** innovative talents, entrepreneur education, Science teacher education programmes.

---

Nigeria is among the developing nations of the world currently beleaguered by high unprecedented unemployment among the teeming population mostly the youths. Recently, the country having 61% of its citizen living below poverty rate of \$1.25 per day was ranked 3<sup>rd</sup>

among the world's top five poorest countries (World Bank Survey, 2014 in Shamsuddin et.al 2018). Poverty in this context refers to the general scarcity or state of one who lacks certain amount of material possession or money. Accordingly, and in attempt to proffer solution to this problem, the government advocates efficient use of human and natural resources to achieve accelerated sustainable social and economic development in a competitive and friendly manner to translate the rapid economic growth into equitable social development for all citizens according to the provisions in two broad objectives of Nigeria vision 20:202 (Agumuoh and Ndirika 2017). Further attempts by the government to reduce poverty and high unemployment rate among The National Directorate of Employment (NDE), the National Economic Empowerment and Development Strategy (NEEDS), the Subsidy Reinvestment Programme (SUREP), N-Power, and the Youth Entrepreneurship Support Programme are all examples of Nigerian graduates working in this area.

Apart from the above measures cultivating undergraduates' innovative talents with higher practical ability is another imperative for coping with the overarching employment demands. It decreases poverty and unemployment rate to the lowest possible level and at the same time assuring supply of basic utilities for decent lifestyle and enhancement in quality of living and quality of life for all residents.

Innovation is a planned total improvement and should never be mistaken for simple adjustment, and it pertains to each and every sustained change in the behaviour patterns of members of an identified social environment. It is a creative deviation from a long-standing practise that is situational and relevant to a specific group in time and place, and when broadly embraced, it is a transformation. A shift in one's cognitive process or the practical implementation of breakthroughs and discoveries is referred to as innovation (Mbanefo & Eboka, 2017; Udu, 2018). The process of creating fresh transformation and discoveries on an original base is known as innovation. It relates to those that have an inventive mindset, the capability to create, and a disposition that is creative (Guo, 2000). It follows that innovation occurs when new inventions and discoveries are put into practise, or when a better thing/method is successfully introduced. The act of bringing new ideas to enhance or make an old one more effective is also known as innovation (Mbanefo & Eboka, 2017). Because improvement necessitates innovation, it may be defined as a new technique, method, or strategy that is purposefully created and developed to increase effectiveness and efficiency in a specific situation. It entails the implementation of new concepts or methods of accomplishing anything that has been introduced or discovered, such as new education methods, manufacturing methods, or building methods. It really is an upgrade over the current one and in a mutually beneficial manner (Udu, 2018).

The capacity to introduce or use new ideas or methods is referred to as innovativeness. The innovation process necessitates creative thinking: Imaginative manipulation of instruments or variables, formulation of models, discovery of possibilities, and creation of new objects and pictures. A change in established rules and practises caused by the introduction of anything new with the goal of enhancing quality, quantity, output, or procedures is known as innovation. New information acquisition mechanisms are facilitated and utilised in innovative learning settings, also, problem-solving skills, information integration from a variety of sources, self-directed learning, and knowledge expansion via intricate exploration and discovery (Mbanefo & Chiaha, 2014).

Innovative practices are tools that empower both students and teachers. Learners' requirements are addressed by engaging in creative practises since it encourages students' desire for learning whilst doing. Teachers can benefit from innovative approaches since they enable teachers to engage students in practical inquiry-based learning. The scientific education curriculum, teaching and learning of science, and improvisation are all areas where these creative techniques in science education are prevalent. Currently, the focus is on hands-on activities and child centeredness of teaching and learning. The science teacher should therefore capitalize on this and make the classroom and the laboratory to be full of activities to enable the students to have first-hand knowledge of science (Udu, 2018).

Talent with innovative awareness, inventive thinking, innovative skill, and innovative attitude are referred to as innovative talents. Individuals with innovative talents are good at discovering, analysing and solving problems, completing creative actions and achieving innovative results (Che & Ji, 2015). The foundation of inventive successes is innovation quality, which may be viewed in two ways: first, the dominant quality, which is the exterior quality demonstrated by new thoughts, new ideas, and new accomplishments. Second, there is a covert feature that may be seen as cognitive qualities that serve as the foundation for innovation while also limiting inventive behaviours. Accordingly, in the practice of personnel training in higher education activities, the school always takes cultivating people's inner qualities as the goal (Li, 2009; Wu, 2009; Guo, 200). However, in cultivating innovative talents, the level of creativity and characteristics of the talents must be brought to bear.

The development of inventive talent improves the country's capability for scientific and technical innovation. It supports the most effective and efficient use of scarce resources in order to achieve an unbeatable position in the international community and to position the country to "stand tall" around the globe. Without innovation, any nation would struggle to survive in the world's industrialised economy. Therefore, innovative talent cultivation is the need of the national progress and sustainable development of developing nations. The country's innovative ability, including knowledge innovation and technological innovation, are decisive factors for a country's survival in the present competitive world (Wang, 2018). A nation without the ability to innovate would struggle to survive. This is predicted on the fact that, in terms of creativity and innovation, the foundation lies in people with innovation consciousness through Innovation talent training that can use certain tools to transform and create (Che & Ji, 2015).

Innovative talents may be divided as knowledge-based innovative talents, technology innovation talents, and management innovation talents based on the concept of knowledge division and innovative knowledge division of labour (Zhou & Zhu, 2010). Knowledge-based talents are excellent talents and can have certain innovations in theory, science and technology as well as scientific research. This type of talent plays a certain role in practical operation and application; while technological innovation talents, management innovation talents and institutional innovation talents belong to application-oriented talents. The intention of training is to improve firms and countries in infrastructures play a significant and successful role in production, service, construction, and management. The responsibility of training human resources is bequeathed on higher education. Therefore, Innovative talent training is a major pre-requisite for the transformation of educational concepts, mostly in the tertiary institutions where Knowledge development is the core of talent innovation. It inspires creative enthusiasm of talents and turn the characteristics of innovation into the needs of talents (Wang, 2018). Consequently, talent innovation in tertiary remains the first element of innovation success, as such, the orientation of tertiary institutions' lecturers is mainly to cultivate applied talents in students for the society and enterprises. In line with this assertion, Che and Ji (2015) maintained that, the talents cultivated by colleges and universities must have knowledge and ability of management, production and service among others. Simultaneously, kids must have a spirit of invention and talent, not just excellent exam grades.

The primary responsibility for the practical execution of government-recommended entrepreneurship education rests with tertiary institutions' lecturers who are front liners in the process of cultivating talents that focus on creative quality, social adaptability, professional skills, knowledge, and moral qualities (Zhou & Zhu, 2010). Moreover, the combination of theory and practice ought to be harnessed to explore the talents in with strong practical values in undergraduates. The development of inventive skills in tertiary institutions is critical not only for economic and social progress, as well as for personal learning and development. The spirit of innovation, inventiveness, and innovative personality are all intrinsic qualities of innovative abilities. Nevertheless, the key restrictions to cultivating inventive skills are, among other things, student quality, institutional framework, and educational practise. There is always a need for policymakers, school administrators, and instructors to make greater practical efforts to foster the

development of inventive abilities (Zheng & Li, 2012).

Entrepreneurship has gained an increasing level of recognition as a source of self-employment initiative for economic development in the global world because it plays a significant role in employment generation of any country. In line with this, the federal government incorporated entrepreneurship into the Nigerian education system and made it mandatory for all students, regardless of specialisation, with the primary goal of providing the necessary skills, competence, and understanding to prepare Nigerian graduates to be self-employed (Afolabi, Kareem, and Okubanjo, 2017). As a result, the content of science education entrepreneurship curriculum needs to consider relevant topics that will guarantee entrepreneurial competencies aside from skills such as opportunity competence for identifying opportunities and systematic development of adequate solutions to complex problems, as well as industry-specific competence that includes technical-know-how and know-what, social competence, and strategic business competence (Yahaya, 2014).

Entrepreneurship is defined as the capacity to recognise and pursue business possibilities while utilising limited resources. It is the act of creating something valuable by committing the necessary time and effort and reaping the financial and personal rewards as well as freedom as a consequence (Hisrich, and Peters, 2002). According to Ezema (2000), an entrepreneur is a business owner who is responsible for the beginning and organisation of the company in order to maximise earnings. An entrepreneur, then, is a person who possesses characteristics such as a desire for success and power, a willingness to take risks, and the competitiveness required to succeed in life. An entrepreneur takes the risk of starting and running a company. The entrepreneur examines internally into his or her surroundings to uncover issues that others are facing (or business possibilities) and offers new products and services to make money (Ugwoke & Abidde, 2014). An entrepreneur, according to Moemeke (2013), is not just an inventor, but also a lifelong learner, a creative person, an initiate, and a prospective manufacturer. As a result, entrepreneurs design, materialise, and bring any country's developmental ambitions and economy to reality, which has a greater impact on its possibilities. Therefore, it becomes eminent that entrepreneurial skills should be inculcated into the science education prospective graduates.

A successful entrepreneur must be willing to take risk, preserve, work under pressure, imitate, think creatively, self-motivated, disciplined, take responsibility, innovative in making decision, financially literate, manage time and people, effective in communication, resilience, courageous resilience and courageous. Proper harnessing of these skills with other production factors by the entrepreneur remains the springboard in which the business thrives to achieve the set goals of establishment which emphasize on maximizing profits.

Scholars and academics have categorised entrepreneurs into many types. Sinha (2015) for instance, categorized entrepreneurs into three major groups based on size of enterprise, gender and technology. The first category which is based on size of enterprise is further divided into three-types namely; small-scale entrepreneur, medium-scale entrepreneur and large-scale entrepreneur. The second category is based on gender and subdivided into two types; male entrepreneur and female entrepreneur while the third category is based on technology and divided into two: technical entrepreneur and non-technical entrepreneur. The technical group, is concerned with technology and therefore, focus mainly on science and technology. Another system of classification given by Ogundele (2007) in NOUN, 2012 outlined three types of entrepreneurs which include entrepreneurs, intrapreneurs and technopreneur. Entrepreneurs are therefore individuals or groups of individuals who carry out entrepreneurship activities to build business empires or a person who creates a venture or starts up a business and nurtures it, faces risks of bringing together businesses. While intrapreneurs are entrepreneurs within an organization who pursue the exploitation of business opportunities as they emerge and are also visionaries within a given organization. Technopreneurs are those who work in the field of high technology and also have the entrepreneurial mindset. In one person, there is a technology inventor and a businessman (Ademowo, 2012; NOUN, 2012; Ihugba, Odii & Njoku, 2013; Olotu. & Ugwuanyi, 2017).

Entrepreneurship education was first initiated by the American Business Schools in 1970's and now is offered in different ways in the universities all over the world. Entrepreneurship education, according to Mauchi, Karambakuwa, Gopo, Kosmas, Mangwende, and Gombarume (2011), is the process of training individuals with the capacity to perceive economic possibilities as well as the information, abilities, and mindsets to engage on opportunities. Entrepreneurship education is very useful in changing students' views towards self-employment and building relevant skills for self-employment in the labour market by providing relevant knowledge, skills and motivation to encourage entrepreneurship and create job opportunities for self-reliance.

Entrepreneurship is perhaps the most important factor of production that enables many economies to grow and thrive, as entrepreneurs enable additional manufacturing factors to be engaged and productively applied within business and the economy. For this reason, entrepreneurial activity is important in any economy to be successful and stable. The potential to increase entrepreneurial activity inside a nation could help to raise the nation's quality of lives. One such way is by means of entrepreneurship education. Entrepreneurship supported infrastructure, according to The Global Entrepreneurship Monitor (GEM), Coaching and training programmes, as well as a variety of legislative measures, would boost a nation's entrepreneurial activity. As a result, entrepreneurial activity would result in employment creation, which is one of the secondary advantages of entrepreneurial activity that enhances society's quality of living (Herrington, Kew & Kew, 2015) The objective of training is to serve the production, service, construction and management for enterprises and countries in infrastructure, who play an active and effective role in practice. The orientation of teachers in universities is mainly to cultivate applied talents because the talent cultivation of universities is mainly to produce the required skills for society and businesses, but also to avoid the shortcomings of traditional talent cultivation and to constantly improve. The main target of training in universities is practical

Entrepreneurship promote economic growth, innovations and creates new jobs. As a result, great focus is placed on entrepreneurship education with the aim of preparing the next generations for an entrepreneurial venture. Entrepreneurship education is indeed a process of preparing the next generation for a career in business. It includes for instance the foundations of entrepreneurial in early economic theory, traits and personality theory, network theory and theory on opportunity identification. The teacher has a crucial role to play in entrepreneurship education. However, most lecturers in tertiary institutions have disciplinary backgrounds like as biology, chemistry, and physics with little previous understanding in educational science and typically no entrepreneurial practical learning expertise. This contrary to the define roles are of pedagogical expert, designer and coach of learning, tutor in personal development, manager of classroom, teacher in a school and society context, and managing personal development as a teacher. Qualifications for these roles do not explicitly foresee in designing and implementing entrepreneurship education. core skills and values linked to entrepreneurship education are seldom a priority in initial teacher education programs. Entrepreneurship education was the domain of management and business economics, in the past and was taught in many higher education institutes, mostly in the faculties of economies and management as well as business schools. Recently, life-sciences, engineering, IT, medicine and health acknowledge the added value of fostering entrepreneurial competence among their students; in the light of new career paradigms, lifelong learning, globalization, employability and a focus on innovation.

Entrepreneurship education as subject matter encompassed learning about entrepreneurship. This type of education as a matter of fact is a matter of culture and state of mind. This type of education which includes those aspects that focus on values, beliefs and attitudes associated with entrepreneurship. It further encompasses other concepts such as an entrepreneurial mindset, entrepreneurialism, entrepreneurial spirit and attitude characterize the discourse around this type of entrepreneurship education. In practical terms, entrepreneurship education prepares students to have an eye for opportunities, be proactive, creative and self-directed. This conception is highly connected to modern views on work, employment and learning and is fostered in key policy documents on life long-learning, innovation and the knowledge society. A typical

example is the 'sense of initiative and entrepreneurship' which is one of the eight main competencies upheld by the European Union as 'being fundamental for each individual in a knowledge-based society'. Thirdly, entrepreneurship education is also about creating specific situations: venturing: turning ideas into 'gestation' activities: firm formation processes. The fundamental outcome of these processes is the new organization itself (Gartner, Carter, Reynolds, Acs, & Audretsch, 2010). Examples of such activities are saving money to invest in the startup, development of business model, prototype of product, service, starting to talk to customers, defining a market for product, service, organizing a start-up team (Gartner, et al., 2010). These activities are typically laid down into a business plan. the three dimensions can be seen as preceding phases in entrepreneurship education and are not mutually exclusive. the student can move from a non-founder to a nascent entrepreneur to a firm founder depending on the student, the entrepreneurial climate as well as the direct social environment and networks,

The goal of entrepreneurship education is to instil in pupils an entrepreneurial spirit and culture that will enable them to contribute meaningfully to the nation's economic progress. It trains youth to be responsible, take risk, manage business and learn for the outcomes by immersing them into life experiences (Amabile and Kramer, 2011). Entrepreneurship education gives new graduates the necessary training to be creative and innovative in recognising amazing company prospects. It also provides youngsters with functional education to help them become more empowered and self-reliant, as well as act as a catalyst for economic development and growth. Entrepreneurship education prepares graduates to build and manage personal enterprises in order to generate self-employment, wealth, and productivity for the nation's economic development. This entails taking material and financial risks while leveraging the existing material and human resources to achieve the goal of starting a company (Ejilibe, 2012). It as a clear expression of active manipulation of human intelligence as demonstrated in creative performance. It aims to discover how the brightest graduates may turn their education into intellectually productive companies, so bringing forth the best in themselves for economic growth.

According to Hisrich and Peters (2002), entrepreneurial skills are characterized as the capacity to develop something useful and novel by devoting the considerable time and resources, accepting the associated economic, mental, and societal risk, and receiving the reward of financial and personal satisfaction as well as independence. Entrepreneurial skills are business skills that a person learns on their own in order to run a successful business and be self-sufficient. The abilities entail the efficient use of information, ideas, and facts to assist a student in developing competencies, providing services, or becoming productive workers of companies (Umunadi, 2014). As a result, entrepreneurship may be defined as the process of finding, starting, organising, and bringing a new product, service, method, strategy, or market to life. It's all about self-employment, which is critical for enhancing one's quality of life and contributing to national growth. Ogundele (2016) stressed that the focus of economic development is entrepreneurial skills acquisition. He noted such skills as: development of entrepreneurial spirit, characteristics and personality, development of technical, technological and professional competencies needed for productive work employment, development of enterprise – building and small business development capabilities to initiate and smart one's own business or self-employment and development of managerial capacity to run the business and other self-employment activities successfully.

Ikeme (2007), in Ibe(2013) noted that the idea of entrepreneurship development is necessitated by:

- a) high rate of graduate unemployment in Nigeria
- b) According to the National Universities Commission (NUC), poor quality graduates are frequently labelled unemployable owing to inadequacies they demonstrate in the workplace.
- c) lack of entrepreneurial spirit among graduate in Nigeria; the fact being that Nigeria is the least industrialized country in the sub-Saharan Africa and

d) high rate of poverty (over half of 140 million populations is wallowing in poverty)

As a response to Nigeria's economic growth tests, the Nigerian government established the National Economic Empowerment and Development Strategy (NEEDS) in 2005. NEEDS' objective is to mobilise Nigeria's resources in order to break with the past's setbacks and leave a federated and wealthy nation to future generations. The Federal Government has established financial institutions to assist SME's entrepreneurs such as People's Bank, the National Economic Recovery Fund (NERFUND), and the Central Bank of Nigeria, which have taken deductions from banks' gross profits to be invested in Small and Medium Scale Entrepreneurs (NDE) and the National Poverty Eradication Programme (NAPEP). The issue in Nigeria is with the project's operational and execution processes. Education is recognised as a critical transformative instrument and strong vehicle for socio-economic enablement in the National Economic Empowerment and Development Strategy (FRN, 2005). Targets for accomplishing this goal among others include making sure that 50 percent of tertiary education graduates attain skills and knowledge to be self-employed and wealth creators thereby restoring the economy. To realize the above goal, some other tertiary educational institutions in Nigeria have fashioned out small business management and entrepreneurship development courses to equip existing and would be entrepreneurs with necessary technical and managerial skills. Also, international organizations had given support in forms of funds and training programmes (e.g., Commonwealth and Fords Foundation).

As a result, entrepreneurial education contributes to the emergence of entrepreneurship skills necessary for efficient and productive lifestyle; It provides youngsters with more creative freedom, more self-esteem, as well as a stronger sense of empowerment over their own life. Various types of skills are required for the students to be successful entrepreneur.

Umunadi (2014) recognised a wide range of competences or abilities required for entrepreneurship success, including management, accounting, and financial skills, sales and marketing capabilities, and fundamental business acumen while Adeyemo (2009) outlined entrepreneurship skills which include management, communication, collaboration, vision development, analytical, evaluation skills and economy skills. Teachers can identify and utilize various strategies such as case study/discussion method, cooperative learning, questioning and conference style learning among others in the classroom to promote entrepreneurial skills in students (Odubunmi, 1983; Odubunmi 1983; Okebukola 1984), monetary expertise, sales and marketing competence, and general business acumen (Umunadi (2014). Ibe (2013) perceived that entrepreneurial success be determined by possession of certain qualities in addition to the skills and knowledge regarding the technical features of owning a business. Such skills could be acquired through organized training and development. Incorporating these abilities into scientific teacher education programmes will lessen students' reliance on government for employment, instil in them the correct mentality, the capacity to be creative and imaginative, and the ability to generate jobs in their chosen field. Nebo (2017), affirm that the potential for progress and poverty mitigation depend on capital made from power inside our minds, not from our ability to take minerals from the ground or look for debt relief and foreign aid. He realised that intellectual capital's value lies in its potential to spawn innovations through university entrepreneurial development courses. However, It is critical to emphasise that, those innovative skills in science singularly can not only produce individuals with useable skills but also without the necessary initiative and impetus for utilizing them at the functional level enough to create wealth.

The study of science involves process skills which are mental tools used in the discovering and acquiring scientific knowledge. According to European Commission (2015), collaboration, listening to others' ideas, critical thinking, being creative and taking initiative, solving issues and taking chances, and making judgments are all essential competences in science education. Science education plays a very important role in promoting the culture of scientific thinking and inspiring citizens to use evidence-based reasoning for decision making. It trains citizens to have confidence, knowledge and skills to participate actively in the increasing complex scientific world by developing in students' competencies for problem solving and innovation as well as

analytical and technological thinking. These are the basis for empowering citizens to be personally fulfilling, socially responsible and professionally engaged in a nation (Agommoh, and Ndiraka, 2017).

Science Education provides opportunities for students to acquire relevant functional knowledge and skills that are associated with scientific processes needed for advancement in science and technology. Science education is concerned with finding answers to problems in a bid to understand and interpret natural phenomena. It helps to inculcate self-discipline, scientific literacy and commitment in the minds of students. Any society's growth and progress are fuelled by science education. It also provides information, abilities, and principles, yet it is in charge of developing human capital, which nurtures, drives, and directs technological innovation and economic prosperity in any country. Therefore, is major prerequisite for scientific and technological development (Udu, 2018). As a result, creative scientific teaching approaches can aid in improving students' academic proficiency in science disciplines. The acquisition and practise of scientific abilities is promoted among students.

Entrepreneurship in science teaching should be adequate enough to produce technopreneurs from the science class. Students should be taught technology alongside with business plans and strategies. Such education should also involve the teaching of local or indigenous technology that can be further developed from creativity of student using locally available materials. For this context, Ademowo (2011) asserted that technological innovation may lead to improved living conditions through the implementation of human knowledge in terms of skills, pure theories, and procedures. Repositioning human activities and finding solutions to issues, as well as creating a scenario that would improve lifestyles, may also be effective for the aforementioned objective. To accomplish this, it is critical to make certain that entrepreneurship is integrated into science teaching particularly in the science teacher education programmes where the prospective teachers are prepared for the process of effective lesson delivery in various science subjects. This is one approach to addressing the twenty-first century's difficulties.

Proper integration of entrepreneurship into science teaching in science teacher education programmes in Nigeria with the use of correct innovative teaching strategies can gradually bail our graduates out of unemployment. The students can graduate with the capacity to take risk with little capital, knowing how to invest and manage small businesses which can become an empire as they persevere (Olotu & Ugwuanyi, 2017). However, teachers play an indispensable role in impacting highly essential technological and business ideas is highly while government on their own part own the responsibilities of providing infrastructure for teaching and learning and also employing more teachers where necessary.

Science education instil in student's confidence, knowledge, analytical and problem-solving skills, competencies and innovations in students which enable them to participate actively in the increasing complex scientific world. Science education does not only prepare the needed manpower for technological development of a nation but also provides students with means of interpreting what they have learnt within their own experience. This makes it possible for them to become self – adaptive. According to the European Commission (2015), science education trains students to be directly involved and engaged, creative and inventive, collaborative, and conversant with complex societal concerns. According to Paulley (2009), science education refers to all types of formal instructions and professional preparation given to teachers with the goal of preparing them for the teaching profession by obtaining a certificate, diploma, or degree from tertiary institutions such as Colleges of Education, Monotechniques, Polytechnics, or Universities as a qualified teacher. Science teacher education prepare the prospective science teachers for our various schools and equipped them with necessary skills to function effectively in the school setting. This improves their quality and productivity in terms of information delivery and resource management in the classroom.

The relevance of entrepreneurship in science education has triggered various researches in science education. For instance, Deveci & Cepni (2017) evaluated the impact of

entrepreneurship education modules integrated with scientific education on pre-service science teachers' entrepreneurial qualities (risk taking, identifying possibilities, being inventive, self-confidence, and emotional intelligence). The study adopted mixed design using 26 third grade preservice science teachers in Turkey and "Entrepreneurship Scale" and semi-constructed interviews as instrument. The study's findings revealed that entrepreneurship education has a statistically significant positive effect on preservice science teachers' risk taking, seeing opportunities, being innovative, and emotional intelligence traits, while also demonstrating that it has a positive effect using qualitative methods. However, there was no statistically significant difference in terms of self-confidence characteristics.

Agumuoh and Ndirika (2017) investigated the strategies for promoting entrepreneurial skills in science education for poverty alleviation using descriptive survey design and 41 science education students from Michael Okpara University of Agriculture Umudike, Abia State as sample. The study's findings revealed that the classroom assessment technique, case study/discussion method, cooperative learning strategies, using questions, conference style learning, use of writing assignment, dialogues and ambiguity are some of the methods/strategies the science teacher can use while teaching science education students in order to promote entrepreneurial skills in their students for poverty eradication.

Afolabi, Kareem and Okubanjo (2017) examined the effect of entrepreneurship education on self – employment initiatives among science and technology students of Gateway Polytechnic, Saepade Remeo, Ogun State, Nigeria. Descriptive survey design was adopted using the sample of 135 final years (HND II and HND II) of science and technology related departments of the college while the instrument was self-administered questionnaire. According to the findings, entrepreneurship education is a smart policy that has a beneficial impact on self-employment efforts.

Gibcus, Kok, Snijders, Smit and Van der Linden (2012) assessed the impact of entrepreneurship education programmes provided by higher education institutions. Survey design was adopted using alumni of higher education institutions in Europe who have attended entrepreneurship education and a control group of alumni that have not participated in this type of education. The study's findings revealed that entrepreneurial education makes a difference. Those who participated in entrepreneurial programmes and activities had stronger entrepreneurial attitudes and ambitions, obtained a job sooner after finishing their education, can innovate more as employees in a corporation, and started more businesses. There was a considerable variation in occupational preferences between male and female alumni; much more female alumni prefer being an employee than male alumni. Simultaneously, much more male alumni prefer being self-employed than female alumni. The alumni were more eager to make the shift to entrepreneurship than the alumni in the control group.

## **Statement of the Problem**

The high rate of unemployment occasioned by unprecedeted population growth and the attendant increase in poverty rate among the citizens has been a recurring problem of Nigeria as a developing economy of the world. Nigeria was recently ranked third among the top five poorest countries in the world, with 61% of the citizen living below poverty rate of \$1.25 per day (World Bank Survey in Shamsuddin, et.al, 2018). This assessment has attracted the of government's interest with other stakeholders and triggered researches and efforts aimed at proffering solution to the problem. One such endeavour is the incorporation of entrepreneurship into the Nigerian educational system's curriculum and making it compulsory for all students irrespective of area of specialization. This is to prepare the Nigerian graduates to be self-employed and reduce the current high unemployment rate among the graduates to foster national development.

Despite this effort, It has been noted that instead of the anticipated reduction in unemployment mostly among graduates, most of them are of them are still roaming the streets seeking government employment and company paid job instead of working towards self-employment.

From the above, there is a gap in the knowledge of accomplishment of the incorporating entrepreneurship education into the education system by the government of Nigeria. This research is an effort to bridge that gap examining the implications of entrepreneurship education on employment generation among science education undergraduates in Rivers State tertiary institutions.

### **Purpose of the Study**

This study assessed the implications of integrating entrepreneurship education into science teacher education programmes employment generation in Rivers State. Specifically, the study tends to determine:

1. the impact of entrepreneurship education on employment generation among science education undergraduate in Rivers State.
2. difference in the impact of entrepreneurship education on employment generation among male and female science education undergraduates in Rivers State.
3. difference in the impact of entrepreneurship education among college of education and University science education undergraduates in Rivers State Nigeria.

### **Research Questions**

The following research questions were raised to guide the study:

1. What impact does entrepreneurship education have on employment generation among science education undergraduates in Rivers State?
2. What difference exist in the impact of entrepreneurship education on employment generation among male and female science education undergraduate in Rivers State?
3. what difference exit in the impact of entrepreneurship education on employment generation among college of education and University science education undergraduates in Rivers State, Nigeria?

### **Hypotheses**

**HO<sub>1</sub>.** There is no significance difference in mean responses of male and female science education undergraduates on the impact of entrepreneurship education on employment generation in Rivers State.

**HO<sub>2</sub>.** There is no significant difference in the main responses of college of education and university science education undergraduates in Rivers State, Nigeria.

### **Methodology**

This study adopted descriptive survey design. The sample of this study comprised 311 science education undergraduates in four tertiary comprising of three universities and one college of education in Rivers State. Due to the small size of the population, census sampling technique was used. A 10-item questionnaire titled "Implications of Integrating Entrepreneurship Education into Science Teacher Education Programmes Questionnaire (IIEESTEPQ)" was used to collect data. It was graded on a four-point scale, Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Two Science Education and one Measurement and Evaluation lecturer validated the instrument, and the reliability coefficient of 0.79 was found via the test-retest method using Pearson Product Moment Correlation. The study questions were answered using mean and standard deviation, and the hypotheses were assessed using the z-test at the 0.05 level of significance. Items in the questionnaire with mean rating of 2.5 and above were accepted while those below were rejected. Hypothesis was accepted when the calculated value of z was less than the table or critical value and rejected when the calculated value of z was greater than the table or critical value.

## Results

### Research Question 1

What impact does entrepreneurship education have on employment generation among science education undergraduates in Rivers State?

**Table 1: Mean and Standard deviation of the responses of science education undergraduates on the impact of entrepreneurship education on employment generation.**

S/N	Item	Mean	SD	Decision
1.	Prepare science education undergraduates to identify noble business opportunities.	3.12	1.15	Accepted
2.	Prepare science education undergraduates be competent in managing business.	2.78	0.85	Accepted
3	Trains science students to possess industry-specific competence in technical-know-how and know-what	1.83	0.92	Rejected
4.	Prepare science education undergraduates to take risk take in business	3.46	0.77	Accepted
5	Does not prepare science education undergraduates to be self-employed.	1.76	0.55	Rejected
6.	Prepare science education undergraduates to be creative in business	2.61	0.75	Accepted
7	Prepare science education undergraduates to be innovative in business	2.97	0.88	Accepted
8.	Raise entrepreneurial intentions in science education undergraduates	3.10	0.99	Accepted
8.	Encourage positive entrepreneurial attitude in science education undergraduate graduates.	2.98	0.77	Accepted
10	Prepare science education undergraduates to be socially intelligent	1.01	1.12	Rejected

**Source: Field survey, 2019**

From Table 1, the mean responses of both college of education and university science education undergraduates were above 2.5 in the following items and were accepted. The items are: prepare science education undergraduates to identify noble business opportunities 3.12, prepare science education undergraduates be competent in managing business 2.78 , prepare science education undergraduates to take risk take in business 3.46, prepare science education undergraduates to be creative in business 2.61, prepare science education undergraduates to be innovative in business 2.97, raise entrepreneurial intentions in science education undergraduates 3.10, and encourage positive entrepreneurial attitude in science education undergraduate graduates 2.98.

### Research Question 2

What Impact does entrepreneurship education have on employment generation among male and female science education undergraduate in Rivers State, Nigeria?

**Table 2: Mean and Standard deviation of the responses of male and female science education undergraduates on the impact of entrepreneurship education on employment generation.**

S/N	Item	Male (N= 203)			Female (N=108)		
		Mean	SD	Decision	Mean	SD	Decision
1.	Prepare science education undergraduates to identify noble business opportunities.	3.10	1.06	Accepted	3.27	0.97	Accepted

2.	Prepare science education undergraduates be competent in managing business.	2.78	1.13	Accepted	2.91	1.05	Accepted
3	Trains science students to possess industry-specific competence in technical-know-how and know-what	2.03	1.19	Rejected	2.12	1.04	Rejected
4.	Prepare science education undergraduates to take risk take in business	2.98	0.93	Accepted	3.10	0.74	Accepted
5	Does not prepare science education undergraduates to be self-employed.	3.10	0.88	Rejected	3.05	1.01	Rejected
6.	Prepare science education undergraduates to be creative in business	3.77	0.81	Accepted	3.81	1.06	Accepted
7	Prepare science education undergraduates to be innovative in business	2.99	0.92	Accepted	2.83	1.00	Accepted
8.	Raise entrepreneurial intentions in science education undergraduates	2.57	1.00	Accepted	2.73	1.08	Accepted
8.	Encourage positive entrepreneurial attitude in science education undergraduate graduates.	2.97	1.11	Accepted	2.91	0.93	Accepted
10	Prepare science education undergraduates to be socially intelligent	2.10	0.95	Rejected	1.68	0.68	Rejected
<b>Total</b>		<b><math>\bar{x}</math> of <math>\bar{x} = 2.42</math></b>			<b><math>\bar{x}</math> of <math>\bar{x} = 2.54</math></b>		

From Table 2, the mean responses of male both male and female science education undergraduates were above 2.5 and above in the following items and were accepted. They are: entrepreneurship education prepare them to identify noble business opportunities, 3.10 and 3.27, competent in managing business, 2.78 and 2.91, take risk in business, 2.98 and 3.10, prepare science education graduates to be self-employed, 3.10 and 3.05, prepare science education undergraduates to be creative in business, 3.77 and 3.81, prepare science education undergraduates to be innovative in business 2.99 and 2.83, Raise entrepreneurial intentions 2.57 and 2.73, and Encourage positive entrepreneurial attitude 2.97 and 2.91.

### Research Question 3

What impact does entrepreneurship education have on employment generation among college of education and university science education undergraduate in Rivers State, Nigeria?

**Table 3: Mean and Standard deviation of the responses of college of education and university science education undergraduates on the impact of entrepreneurship education on employment generation.**

S/N	Item	College of education (N= 75)			University (N=236)		
		Mean	SD	Decision	Mean	SD	Decision
1.	Prepare science education undergraduates to identify noble business opportunities.	3.21	0.99	Accepted	3.14	1.10	Accepted

2.	Prepare science education undergraduates be competent in managing business.	2.93	0.87	Accepted	3.71	1.11	Accepted
3	Trains science students to possess industry-specific competence in technical-know-how and know-what	1.67	1.19	Rejected	2.34	1.21	Rejected
4.	Prepare science education undergraduates to take risk take in business	3.52	1.21	Accepted	2.75	0.88	Accepted
5	Does not prepare science education undergraduates to be self-employed.	2.11	0.92	Accepted	1.11	0.83	Accepted
6.	Prepare science education undergraduates to be creative in business	2.63	1.81	Accepted	2.93	0.98	Accepted
7	Prepare science education undergraduates to be innovative in business	2.86	1.01	Accepted	2.97	0.99	Accepted
8.	Raise entrepreneurial intentions in science education undergraduates	2.89	1.01	Accepted	2.56	1.18	Accepted
8.	Encourage positive entrepreneurial attitude in science education undergraduate graduates.	2.87	1.11	Accepted	2.63	0.88	Accepted
10	Prepare science education undergraduates to be socially intelligent	1.90	0.99	Rejected	2.01	1.02	Rejected
<b>Total</b>		<b><math>\bar{x}</math> of <math>\bar{x} = 2.42</math></b>			<b><math>\bar{x}</math> of <math>\bar{x} = 2.54</math></b>		

From Table 3, the mean responses of both college of education and university science education undergraduates were above 2.5 in the following items and were accepted. The items are: prepare science education undergraduates to identify noble business opportunities 3.21 and 3.14, prepare science education undergraduates be competent in managing business 2.91 and 2.71, prepare science education undergraduates to take risk take in business 3.25 and 2.75, prepare science education undergraduates to be creative in business 2.63 and 2.93, prepare science education undergraduates to be innovative in business 2.86 and 2.97, raise entrepreneurial intentions in science education undergraduates 2.89 and 2.56, and encourage positive entrepreneurial attitude in science education undergraduate graduates 2.87 and 2.63.

### Hypothesis 1

There is no significant difference in mean responses between male and female Science Education undergraduates on the impact of entrepreneurship education on employment generation in Rivers State, Nigeria.

**Table 4: z-test analysis of the mean responses of male and female Science Education undergraduates on the impact of entrepreneurship education on employment generation.**

Gender	N	$\bar{x}$	SD	Df	z-cal	z-table	Decision
Male	203	2.78	0.96				
Female	108	2.69	0.81	266	0.750	1.960	accepted

( $p = 0.05$ )

From Table 4,  $z\text{-cal} = 0.750$  is less than  $z\text{-table} = 1.960$ . Therefore, the null hypothesis which states that there is no significant difference in mean responses of college of education and university science education undergraduates on the impact of entrepreneurship education on employment generation in rivers state, Nigeria is accepted. This implies that, there is no significant difference in mean response of college of education and university science education undergraduates on the impact of entrepreneurship education on employment generation.

## Hypothesis 2

There is no significant difference in mean responses of college of education and university science education undergraduates on the impact of entrepreneurship education on employment generation in Rivers State, Nigeria.

**Table 5: z-test analysis of the mean responses of college of education and university Science Education undergraduates on the impact of entrepreneurship education on employment generation.**

Gender	N	$\bar{x}$	SD	Df	z-cal	z-table	Decision
<b>College of education</b>	75	2.78	1.01				
<b>University</b>	236	2.69	0.94	266	1.430	1.960	accepted

( $p = .050$ )

From Table 5, the calculated value of  $z = 1.430$  is less than the table or critical value of 1.960. Therefore, the null hypothesis which states that there is no significant difference in mean responses of college of education and university science education undergraduates on the impact of entrepreneurship education on employment generation in Rivers State, Nigeria is accepted. This implies that, there is no significant difference between the impact of entrepreneurship education on employment generation among college of education and university science education undergraduates.

## Discussion of Findings

Evidence from the findings of this study showed entrepreneurship education prepare science education undergraduates to identify noble business opportunities, prepare science education undergraduates be competent in managing business, prepare science education undergraduates to take risk take in business, prepare science education undergraduates to be creative in business, prepare science education undergraduates to be innovative in business, raise entrepreneurial intentions in science education undergraduates, and encourage positive entrepreneurial attitude in science education undergraduate graduates (Table 1).

These findings support the findings of Deveci and Cepni (2017), who discovered that integrating entrepreneurship education modules into education had a statistically significant positive impact on preservice science teachers' science entrepreneurship characteristics like taking risks, to see prospects, being innovative, and emotionally intelligent. The findings support the results of Afolabi, Kareem, and Okubanjo (2017), who discovered that entrepreneurship education has a positive effect on self-employment initiatives in a study on the effect of entrepreneurship education on self-employment initiatives among science and technology students at Gateway Polytechnic in Saepade Remeo, Ogun State, Nigeria as well as Gibcus, Kok, Snijders, Smit, and van der Linden (2012), who discovered that in Europe, entrepreneurship education makes a difference and that those who participated in entrepreneurial programmes and activities demonstrated more entrepreneurial attitudes and intentions, got a job sooner after finishing their studies, can innovate more even as employees in a firm, and started more businesses during the evaluation of the impact of entrepreneurship education programme.

Evidence of this study infer that, the entrepreneurial skills acquired by science education undergraduates can be very useful in encouraging self-employment among science education

graduates thereby reducing the present high rate of unemployment among Nigerian graduates in general and science education in particular. With this the graduates will not only become productive but attain self-reliance and contribute meaningfully to the development of the country instead of depending on government and companies for employment.

There was no significant gender difference in impact of entrepreneurship education on self-employment initiative among science education undergraduates. This infer that the entrepreneurship education into science education is not gender discriminatory as it beneficial to both male and female science education undergraduates and give credence to the relevance of its introducing entrepreneurship education by the federal government of Nigeria. The result of this study however, disagrees with the findings of Gibcus, et.al (2012) where there was a significant difference in employment generation between male and female alumni with much more male alumni prefer being self-employed than female alumni. Furthermore, there was no significant difference in impact of entrepreneurship education of university and college of education science education undergraduates in Rivers State. This infer that the impact is the same irrespective of the type of science teacher education programmes.

## Conclusion

The study concluded that entrepreneurship education instils entrepreneurial capabilities and skills in undergraduate science education, which encourages the creation of self-employed job opportunities for unemployment and poverty reduction, as well as the promotion of national development in Nigeria. This is applicable to both male and female as well as university and college of education science education undergraduates.

## Educational Implications.

Findings of this study have the following educational implications.

1. The acquired entrepreneurial skills and competencies promote self-employment initiative among undergraduates.
2. Findings of this study provides avenues for creation of self- employment opportunities which reduces unemployment and promote growth and development of the nation.
3. The reliable source of income for graduates ensures self-reliance and reduce the level of dependence on government for job opportunities.

## Recommendations

1. Government should ensure effective implementation of entrepreneurship education in tertiary institutions.
2. Lecturers should encourage science education undergraduates to embrace entrepreneurship education.
3. Science Education graduates should be supported with grants to equip them to start up micro or small-scale production industries.
4. Science Education graduates should be encouraged to apply acquired entrepreneurial skills to breach unemployment and poverty amongst school leavers.
5. Colleges and universities should take the cultivation of innovative talents as its educational mission,

## References

1. Ademowo, A. J. (2012). Indigenous Languages and Techno-Scientific Development in Africa. *Afro Asian Journal of Social Sciences*, 3(3.3), 57 -68.
2. Adeyemo, S. A (2009). Understanding and acquisition of entrepreneurial skills. a pedagogical re-orientation for classroom teacher in science education. *Journal of Turkish Science Education* 6(3), 57-65.

3. Afolabi, M.O. Kareem. F.A.X & Okubanjo, I.O. (2017). Effect of Entrepreneurship education on self-employment initiative among Nigerian science &technology student. *Journal of Education and Practice*, 8(15), 2017.
4. Agumuoh, Poco & Ndirika. M.C. (2017). Strategies for promoting entrepreneurial skills in science education students for poverty eradication. *Journal of Research methods in education*, 7 (3). 45-49.
5. Akande, M. (2017). Top 10 indicators of economic development in a country Retrieves on August 15, 2019 from : <https://www.legit.ng/1139672-top-10-indicators-economic-development-a-country.html>
6. Amabile, T. & Kramer, S. 2011. *The progress principle: Using small wins to ignite joy, engagement, and creativity at work*, Harvard Business Press.
7. Che, R & Ji, H. (2015). Concept analysis of applied innovation talents. *University Education Management*, (1), 81-85.
8. Deveci, I. & Cepni, S. (2017). The effect of entrepreneurship education modules integrated with science education on the entrepreneurial characteristics of pre-service science teachers. *Socialinisdarbas*, 15(2), 56–85.
9. Ejilibe, O. C. (2012). Entrepreneurship in biology education as a means for employment. *Knowledge Review*, 26(3), 96-100.
10. European Commission, (2015). *Science education for Responsible Citizenship. Report to the European Commission of the expert group on science education*. Luxembourg: Publications Office of the European Union.
11. Ezema, P. C. (2000). *Inculcation of entrepreneurial skills in students: A challenge to home economics teachers*. A conference Paper Presented at the 5<sup>th</sup> National Conference of Women in Colleges of Education at F.C.E Akoka Lagos between 9<sup>th</sup> -1<sup>st</sup> October, 2000.
12. Gibcus, P., Kok, J., Snijders, J. Smit, L & van der Linden, B. (2012). *Effects and impact of entrepreneurship programmes in higher education*. European Union.
13. Guo, W. (2000). On innovative education and the characteristics of it. *China Education Journal*. 1.9-12.
14. Herrington, M., Kew, J. and Kew, P. (2015). 2014 GEM South Africa Report. Accessed on December, 20 2016 from: <http://www.gemconsortium.org/country-profile/108>.
15. Hisrich, R. D. and Peters, M. P. (2002). *Entrepreneurship (5<sup>th</sup>ed)*. New York: McGraw-Hill NY.
16. Ibe, E. (2013). Assessment of the entrepreneurship studies for job creation in Nigerian Universities. *Journal of the Science Teachers Association of Nigeria*, 48(1):57-65.
17. Ihugba, O. A., Odii, A. & Njoku, A.C. (2 13). Challenges and prospects of entrepreneurship in Nigeria. *Academic Journal of Interdisciplinary Studies*, 2(5), 25-36.
18. Li, C. (2009). The role of physical education in the development of innovative talents in colleges and universities. *China Adult Education*,3, 12 – 20.
19. Mauchi, F. N., Karambakuwa, R. T., Gopo, R. N., Kosmas, N., Mangwende, S. and Gombarume, F. B. (2011). Entrepreneurship education lessons: A case of Zimbabwean tertiary education institutions. *International Research Journals*, 2(7), 1306-1311.
20. Mbanefo, M. C. & Eboka, O. C. (2017). Acquisition of Innovative and Entrepreneurial Skills in Basic Science Education for Job Creation in Nigeria. *Science Education International*, 28 (3), 207 – 213.
21. National Open University of Nigeria NOUN (2012). National Open University of Nigeria.

## GST 301 student learning material

22. Nebo, O.O. (2017). A paper presented at the workshop organized at centre for Entrepreneurship and Development Research, University of Nigeria, Nsukka.
23. Odubunmi E.O. (1983). *The effect of socio-economic background and teaching strategies on learning outcome in integrated science*. Unpublished PhD Thesis, University of Ibadan.
24. Ogundele, O.K. (2016). Entrepreneurship studies and development in Nigeria: The missing link. *Lagos Organization Review*, 2(4):69-74.
25. Olotu, A. & Ugwuanyi, P. (2017). Science Education and Entrepreneurship for National Growth and Development. *Capital Journal of Education Studies*, 2017, 5(1), 149 – 159.
26. Paulley, F. G (2009). The role of education in the realization of the MDGs in Nigeria. *African Journal of Historical Sciences in Education*, 5 (1&2): 230-242.
27. Sinha, D.K. (2016). Top 10 Types of Entrepreneurs – Explained! General Studies GST 301 student learning material, Retrieved on January, 28th 2012 from [www.yourArticleLibrary.com](http://www.yourArticleLibrary.com).
28. Udu, D. A. (2018). Innovative practices in science education: a panacea for improving secondary school students' academic achievement in science subjects in Nigeria. *Global Journal of Educational Research*, 17, 2018, 23-30.
29. Umunadi, E.K. (2014). Acquisition of entrepreneurial and technical education skills for global competitive and job creation. *International Journal of Educational Research*, 13(1), 128-144.
30. Wang J. (2018). Research on the Factors of the Innovative Talents in Colleges and Universities. Paper presented at the 9th International Symposium on Advanced Education and Management (ISAEM 2018), 62 -65.
31. Wu, T. (2009). Of innovative training mode. *Henan education*.2.7-8.
32. Yahaya, U. (2014). *Why we set entrepreneurship studies in varsities – Federal Government*. Retrieved on August, 10, 2019 from <http://www.thenigeriavoice.com/nvnews45849/1/why-we-set-up-entrepreneurship-studies-invarsities.html>.
33. Zheng, Q Li, Z. (2012). On How to cultivate innovative talents in colleges and universities. *Science and Technology Innovation and Application*, (2), 235.
34. Zhou, X. & Zhu J. (2010). On the Cultivation of College Students' Innovative Ability. *Entrepreneur World (Theoretical Edition)*, , (12),123-124.